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A GRANGER CAUSALITY ANALYSES ON PRODUCTION AND EXPORT OF COFFEE INDUSTRY IN INDIA

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Abstract: *The increasing economic integration of Indian economy with the global process has brought significant challenges and changes at the door of the agriculture sector. Within the agriculture, plantation crops are an important segment of export oriented crops. Coffee occupies a place of pride in plantation sector. Coffee is an important commodity and a popular beverage. The liberalized coffee market gave an opportunity for the coffee growers to sell their produce in both domestic and international market thus India stands fifth in global production and occupies seventh place in exporting coffee to global market, coffee adds-up its share in National income from export section., coffee exports are not only a vital contributor to foreign exchange earnings but also account for a significant proportion of tax income and gross domestic product. Hence an attempt is made to study trends in coffee export. The objective of the paper is to study whether coffee production is paving the way for huge coffee export from India to the international market. The analysis is based on secondary data collected from the publications of Coffee Board of India, Ministry of Commerce and journals. Unit root test is used to test the stationarity and Pair wise Granger Causality test is used to check the relationship between coffee production and coffee export in India. The result showed that there is no granger cause between production and export.*

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I. INTRODUCTION

Coffee occupies a place of pride in plantation sector. Coffee is an important commodity and a popular beverage. Arabica and Robusta are the varieties in coffee it is the second largest traded commodity in the world and is an extremely important foreign exchange earner. Traditionally Brazil has been the world leader in production of green coffee followed by Vietnam, Indonesia and Colombia. Among the top ten coffee producers, Brazil has lion share. Its total output was 2.44 Million Tonnes where India produced 0.29 Million Tonnes and occupies fifth place in the rank. Over 2.25 billion cups of coffee are consumed in the world every day. India occupies seventh place in exporting coffee to global market. Though coffee production is located mainly in developing countries, consumption is concentrated in the industrialized economies it exports mainly to Italy, Germany, and Russian federation in large quantities; these are the top three buyers of Indian coffee. Even coffee add-up its share in National income from export section.

Liberalization in coffee industry gave entry to new players in the market and one among them was export agencies which took sole responsibility to export the produce to the international market, Around 70 countries produce coffee, of which the Exporting Members of the International Coffee Organization are responsible for over 97 percent of world output, For many countries, coffee exports are not only a vital contributor to foreign exchange earnings but also account for a significant proportion of tax income and gross domestic product. But Irony is that India in international market is not a price maker but a price taker Coffee is an export oriented commodity with about 75% of the coffee produced in the country being exported. As such the returns to coffee growers largely depend on international prices. Though the domestic prices are also aligned with international prices, they have been found to be a little higher than the international prices. In view of this price differential, Coffee Board is endeavouring to promote domestic coffee consumption to create a buffer against the international price fluctuations.

II. REVIEW OF LITERATURE

Vector auto regressions are used to model price transmission through the coffee processing chain, from producers to the world market and from the world market to consumers, by ***Ben (2004)*** "Market Power in International Commodity Processing Chains: Preliminary Results from The Coffee Market**"** A comparison is made of price dynamics against a backdrop of two very different market structures the pre and post liberalization.

Interestingly, the analysis shows that liberalisation has not improved price transmission as significantly as expected and in some respects appears to have worsened it noticeable.

Indira (2007) in a study "Gainers and losers in transition: an evaluation of liberalised coffee marketing system in India" has analyzed the impact of coffee liberalization on coffee growers and seller and other market participants. Problem faced before liberalisation and benefits gained after liberalisation has been studied. The decline of Coffee Board and the new emergence of ex-garden sale, trading companies, fair trade, market associations and co-operative markets were highlighted. The study reveals that trade liberalisation has shown a positive impact on growers, traders, exporters and other market players who had proper market skills.

A study about the impact of coffee market liberalisation in Tanzania by ***Lukanima (2009)*** revealed the volatility of coffee producer prices and the relationships between producer prices and world coffee market prices. Like other developing countries, the Tanzanian coffee market has been undergoing liberalisation reforms since 1993. Some studies were conducted on the impact of agricultural liberalisation in Tanzania, but only few of them have focused on coffee prices. Moreover, most of these previous studies produce contradicting results, making the debate about the outcomes of Tanzanian coffee liberalisation inconclusive. Particularly, whereas the link between hedging strategies and price behaviours is inseparable, there is no proper evidence of the study about the impact of the Tanzanian coffee market liberalisation on coffee producer price behaviours.

Russell Bill (2012) in the study "Coffee Market Liberalisation and the Implications for Producers in Brazil, Guatemala and India" analysed the trade liberalization. The Standard approach to exhibit the relationship between world and producer prices of coffee did not include the effects of changing government policies and market structures. These changes have led to large structural breaks in the relationship between the prices inferring the standard estimates are biased. The model studies on coffee prices in Brazil, Guatemala and India allowing for the structural breaks and show that the liberalisation of coffee markets has benefited producers substantially both in terms of a higher share of the world price of coffee and higher real prices.

III. OBJECTIVE

The research study has set out the following objectives:

- To study weather increase in coffee production in India has paved the way for huge coffee export to international market.

IV. HYPOTHESES

Ho: There is no relationship between production and export of coffee

V. METHODOLOGY

This study is based on secondary data. Secondary data was collected from the records of Coffee Board of India, Ministry of Commerce, journals and internet. Time series data from 1979 to 2013 of production and export is collected from The Coffee Board of India, Bangalore.

To test the weather the variables are stationary in classical approach - ACF, PACF and graph was used and in modern approach - Unit root test- Augmented Dickey-Fuller test was used.

To test the relationship between the two variables Pair wise Granger causality test was used. Eviews software was used to conduct all these tests and Give win2 software was also used to draw ACF, PACF and graphical analysis.

Impact of increasing coffee Production on coffee export in India

The objective tries to analyse whether export has formally increased with the policy reform or remained the same. In order to look whether the production of coffee has increased the export volume of coffee- the data from the year 1979 to2013 of total production and total export of coffee in India is taken into consideration. The statistical data on production and export of coffee is shown in table.1.

Table.1: Production and Export of Coffee in India from 1979-80 to 2012-13

Year	Production	Export
1979-80	149835	61380
1980-81	118646	86253
1981-82	150000	83817
1982-83	129952	83824
1983-84	105029	71179
1984-85	195110	68896
1985-86	122450	99298
1986-87	192094	86666
1987-88	122713	92533
1988-89	214715	98266
1989-90	118053	134052
1990-91	170000	100110
1991-92	180000	111458
1992-93	169395	113585
1993-94	212000	136690
1994-95	180100	137395
1995-96	223000	170578

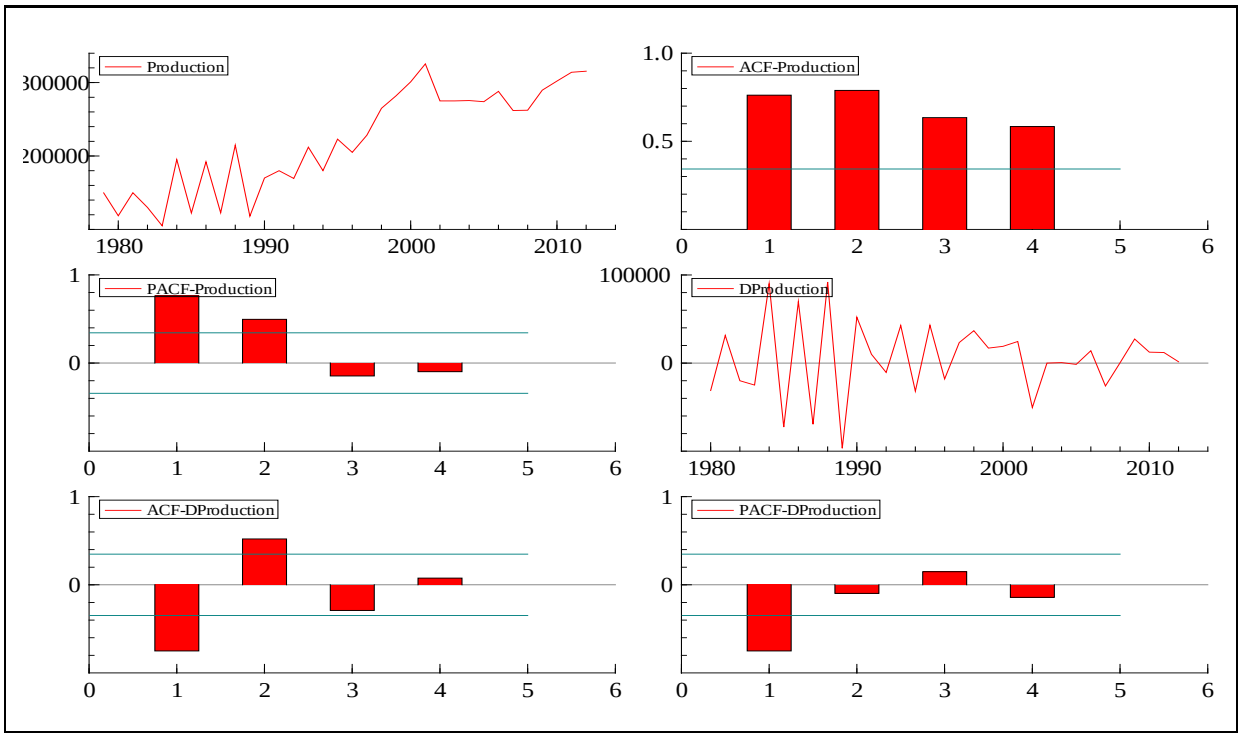
Year	Production	Export
1996-97	205000	181237
1997-98	228288	179059
1998-99	265000	211623
1999-00	282000	195000
2000-01	301000	247000
2001-02	325454	176300
2002-03	275000	207333
2003-04	275000	232684
2004-05	275500	211715
2005-06	274000	210555
2006-07	288000	249030
2007-08	262000	218996
2008-09	262300	210000
2009-10	289600	197169
2010-11	302000	299737
2011-12	314000	324253
2012-13	315500	310612

Source: Indian coffee board.

VI. ANALYSIS SEGMENT –RESULTS AND DISCUSSIONS-

Analysis of Classical method to test: ACF, PACF and graph

Production



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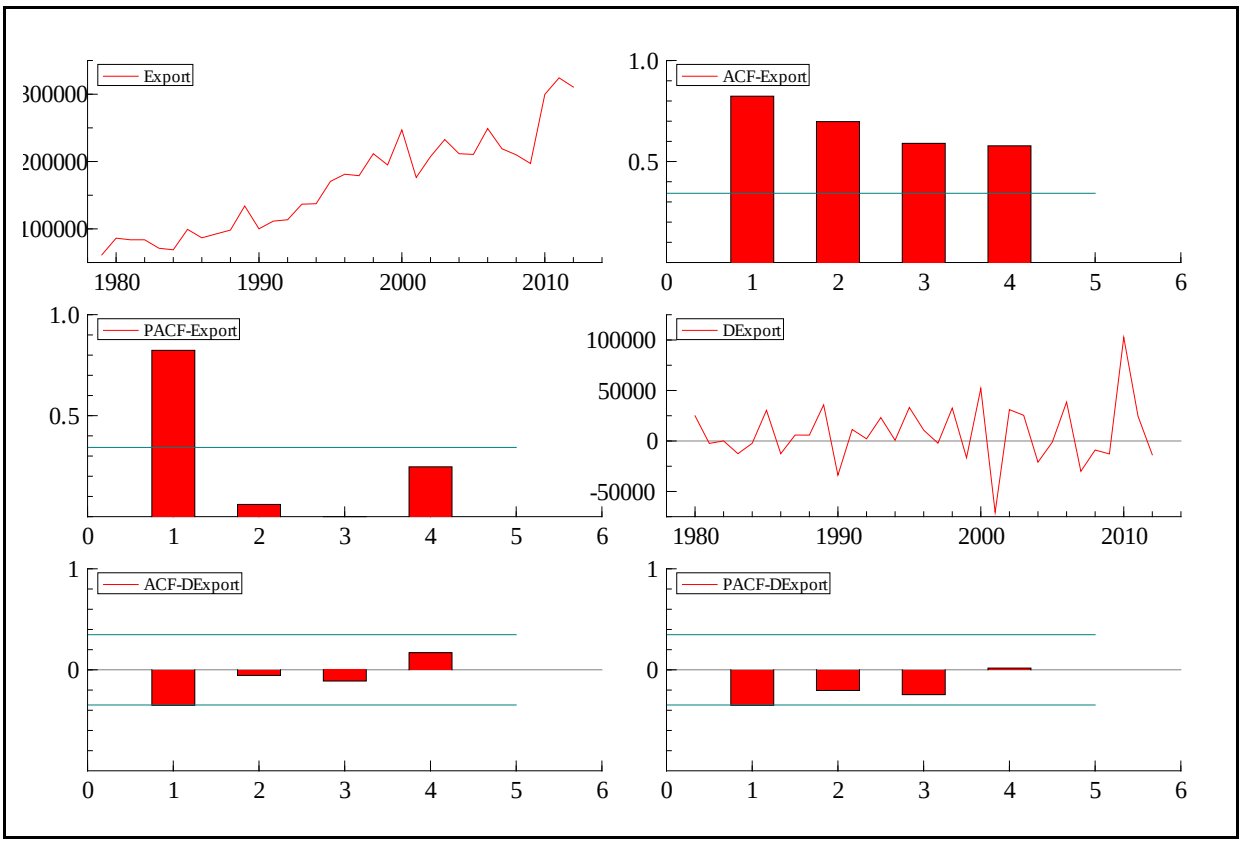

Analysis of modern method to find out Unit root test: Augmented Dickey-Fuller test

Production (with the combination of level and Intercept)

Null Hypothesis: PRODUCTION has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.586326	0.8601
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

With the combination of level and intercept the tested variable 'production' was not stationaryas the "P-value" is more then 0.005, so next step was taken for consideration.

Production (with combination of 1st difference and intercept)

Null Hypothesis: D(PRODUCTION) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.89656	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(PRODUCTION,2)

Method: Least Squares

Date: 04/15/14 Time: 14:49

Sample (adjusted): 3 34

Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PRODUCTION(-1))	-1.750297	0.117497	-14.89656	0.0000
C	10000.83	5060.313	1.976326	0.0574

R-squared	0.880909	Mean dependent var	1021.531
Adjusted R-squared	0.876939	S.D. dependent var	81019.35
S.E. of regression	28421.64	Akaike info criterion	23.40815
Sum squared resid	2.42E+10	Schwarz criterion	23.49976
Log likelihood	-372.5304	Hannan-Quinn criter.	23.43852
F-statistic	221.9074	Durbin-Watson stat	2.158944
Prob(F-statistic)	0.000000		

The variable in the Augmented Dickey-Fuller test is stationary at 1st difference with intercept.

Export *(with the combination of level and Intercept)*

Null Hypothesis: EXPORT has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.761635	0.8167
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

With the combination of level and intercept the tested variable for export was not stationary as the "P-value" is more then 0.005, so next step was taken for consideration.

Export (with combination of 1st difference and intercept)

Null Hypothesis: D(EXPORT) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.935253	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(EXPORT,2)

Method: Least Squares

Date: 04/15/14 Time: 14:51

Sample (adjusted): 3 34

Included observations: 32 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXPORT(-1))	-1.357271	0.171043	-7.935253	0.0000
C	9946.122	5331.897	1.865400	0.0719

R-squared	0.677309	Mean dependent var	-1203.563
Adjusted R-squared	0.666553	S.D. dependent var	50386.50

S.E. of regression	29095.63	Akaike info criterion	23.45503
Sum squared resid	2.54E+10	Schwarz criterion	23.54663
Log likelihood	-373.2804	Hannan-Quinn criter.	23.48539
F-statistic	62.96823	Durbin-Watson stat	2.132099
Prob(F-statistic)	0.000000		

Augmented Dickey-Fuller test for level data

Variable	T-value		P-value	
	Level and intercept	1st difference and intercept	Level and intercept	1st difference and intercept
Production	-0.586326	-14.89656	0.8601	0.0000
Export	-0.761635	-7.935253	0.8167	0.0000

The variable in the Augmented Dickey-Fuller test is non-stationary at level and intercept as P value for production is 0.8601and for export it is 0.8167 hence further level was tested with the combination of 1st difference and intercept and the value for both production and export showed for "P" was 0.0000 which shows stationary. Therefore both the variable in the augmented dickey fuller test is at stationary with the combination of 1st difference with intercept.

Further Pair wise Granger Causality test was used to test the relation between Production and Export

Granger causality test

Pair wise Granger Causality Tests

Date: 04/15/14 Time: 14:53

Sample: 1 34

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
PRODUCTION does not Granger Cause EXPORT	32	2.16561	0.1342
EXPORT does not Granger Cause PRODUCTION		2.25234	0.1246

The granger causality has been identified at lag 2 for production and export. As probability value is not less than 0.05 the null hypothesis has been accepted which means production

does not granger cause export nor export granger cause production, hence there is no relationship between production and export.

VII. CONCLUSION

The saga of coffee industry in India points out that taken the two variables production and export, the stationarity was proved for both the variables with the combination of 1st difference and intercept by using augmented dickey fuller test in Unit root test. Further after attaining stationarity in order to look at the relationship of whether coffee production has any impact on coffee export a causality test known as Pair wise Granger Causality test was used taking lag 2 into consideration as the probability for both the variables is not less than 0.05 the null hypothesis was accepted, which depicted that neither production granger cause export nor export granger cause production, therefore the result shows that there is no relationship between production of coffee and coffee export in India.

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